

referred to as “the Wu et al. ‘198 patent”); rejected claims 27 – 49 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,870,158 to Doyle et al. (hereinafter referred to as “the Doyle et al. ‘158 patent”) in view of the Wu et al. ‘198 patent; and rejected claims 50 – 54 under 35 U.S.C. §103(a) as being unpatentable over the Doyle et al. ‘158 patent in view of the Wu et al. ‘198 patent and a publication to Guess et al. entitled *Computer Treatment Estimates in Orthodontics and Orthognathic Surgery* (hereinafter referred to as “the Guess et al. publication”).

By this Response, the rejections to independent claims 27 and 50 and the rejections to the claims dependent thereon have been traversed.

It is respectfully submitted that no new matter within the meaning of 35 U.S.C. §132 has been introduced to this application.

Rejections Under 35 U.S.C. §103(a)

To establish a *prima facie* case of obviousness, the Examiner must establish: (1) some suggestion or motivation to modify the references exists; (2) a reasonable expectation of success; and (3) the prior art references teach or suggest all of the claim limitations. *Amgen, Inc. v. Chugai Pharm. Co.*, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991); *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988); *In re Wilson*, 165 USPQ 494, 496 (CCPA 1970).

1. The Sachdeva et al. ‘120 Patent In View of the Wu et al. ‘198 Patent

The Examiner rejected claims 27 – 54 as being unpatentable over the Sachdeva et al. ‘120 patent in view of the Wu et al. ‘198 patent. The Examiner suggested filing a translation of the present application’s priority document no. PCT/IL98/00593 to establish that the presently claimed invention is supported thereby.

Response

By this Response, Applicants have submitted, in an Appendix to this paper, an English language translation of priority document no. PCT/IL98/00593. Applicants respectfully traverse the Examiner's rejection since the priority document of the present application pre-dates the cited primary reference. Support for the presently claimed invention can be found on page 11, lines 16 – 22 of this document. Therefore, the present application pre-dates the cited primary reference thereby making the cited primary reference improper.

The Sachdeva et al. '120 patent was published on February 26, 2002 and has a filing date of November 30, 1999. Although the present application has a filing date of January 2, 2004, it claims priority back to PCT application no. PCT/IL98/00593 which was filed on December 7, 1998 and further claims priority back to Israeli application no. 122807, which was filed on December 30, 1997. Thus, since the PCT application and Israeli application were respectively filed one and two years before the cited primary reference, the Sachdeva et al. '120 patent, is not a proper reference and the Wu et al. '198 patent cannot be combined with it to render the presently claimed invention obvious.

The Wu et al. '198 patent discloses a dental modeling simulator that operates by measuring molded impressions of teeth on a support table, the support table defining an X-Y plane. A laser probe detects Z-axis measurements in a first position; the molded impression is then tilted and the measuring process is repeated to obtain theretofore hidden measurements. A virtual three-dimensional model is thus produced.

Among other things, independent claim 27 recites a method for selecting orthodontic components comprising "generating a prescription for orthodontic treatment including specifying the

type of components used based on the components of the virtual treatment.”

In contrast to the presently claimed invention, the Wu et al. ‘198 patent is completely silent as to a step of “generating a prescription for orthodontic treatment including specifying the type of components used based on the components of the virtual treatment” as recited in independent claim 27. The Wu et al. ‘198 patent is directed toward modeling of a patient’s teeth rather than diagnosis of problems and *prescriptions* of solutions for those problems. Thus, by itself, the Wu et al. ‘198 patent does not disclose, teach or suggest all of the features recited in independent claim 27 of the present application because the focus of the Wu et al. ‘198 patent is narrowly directed toward three-dimensional modeling.

Similarly, the Wu et al. ‘198 patent does not disclose, teach or suggest all of the features recited in independent claim 50.

Among other things, independent claim 50 recites a method for selecting real-life orthodontic components for use in an orthodontic treatment of an individual comprising “selecting a virtual set of orthodontic components representing real-life orthodontic components that may be used in an orthodontic treatment, said virtual set of components simulating the components of said real-life set....”

In contrast to the presently claimed invention, the Wu et al. ‘198 patent does not disclose, teach or suggest a step of “selecting a virtual set of orthodontic components representing real-life orthodontic components that may be used in an orthodontic treatment, said virtual set of components simulating the components of said real-life set....,” as recited in amended independent claim 50. Again, the Wu et al. ‘198 patent is directed toward modeling of a patient’s teeth rather than diagnosis of problems and prescriptions of solutions for those problems. Thus, by itself, the Wu et al. ‘198 patent does not disclose, teach or suggest all of the features recited in independent claim 50 of the

present application because the focus of the Wu et al. '198 patent is narrowly directed toward three-dimensional modeling.

Accordingly, Applicants respectfully request that the Examiner allow amended independent claims 27 and 50 and allow all claims dependent thereon by reconsidering and withdrawing the rejection of these claims as being obvious over the cited prior art.

2. Doyle et al (US 5,879,158) in view of Wu et al (US 5,338,198)

The Examiner rejected claims 27 – 49 as being unpatentable over the Doyle et al. '158 patent in view of the Wu et al. '198 patent.

Response

By this Response, Applicant respectfully traverses the Examiner's rejection since all of the features of the presently claimed invention are not disclosed, taught or suggested in the cited prior art combination.

Claim 27 recites: "[a] method for selecting orthodontic components for use in an orthodontic treatment of an individual, the method comprising: (i) in a computer: (a) selecting a virtual set of orthodontic components representing components that may be used in an orthodontic treatment, (b) providing a first virtual three-dimensional (3D) image of a 3D model of the individual's teeth comprising teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction, (c) associating the virtual set of components with the teeth in said virtual image in a manner resembling that in which such components are associated with teeth in an orthodontic treatment, to obtain a second image of said 3D model with said components associated therewith, and (d) using a set of rules, including at least one rule, defining the effect of said set of components on said teeth, computing the

manner of movement of the teeth as a result of said effect, so as to obtain a third image comprising the teeth model following the virtual treatment; and (ii) generating a prescription for orthodontic treatment including specifying the type of components used based on the components of the virtual treatment.”

The method disclosed in the Doyle '198 patent is based on the following steps (see for example, on col. 3 lines 8-26 and a more detailed explanation in col. 6 line 18 to col. 10 line 34): displaying a center axis of each tooth in the set of teeth, wherein the center axis extends between a root portion and a crown portion of the tooth; determining differences between the position and orientation of the center axis of each tooth and torque, tip and angulation values for each tooth representing a desired position and orientation of the tooth for a selected set of orthodontic brackets; determining differences between the digitized three dimensional video image and a statistically average tooth for each tooth; determining an optimum position of each bracket on an associated tooth for moving the tooth to the desired position and orientation; determining a size and shape of a positioning jig for each bracket and tooth combination for optimum positioning of each bracket on a respective tooth for moving the tooth to the desired position and orientation; attaching each jig to an associated bracket and installing each jig and bracket combination on a respective tooth in said optimum position; removing each jig from its associated bracket; and attaching an archwire to the brackets.”

The Doyle method involves the determination, for each tooth, of a "bracket sighting point" or BSP, which is a virtual and theoretical point that represent the center axis of the tooth (see step 17 in Fig. 3a, col. 6 lines 21-41). The Doyle method further involves the presentation of an archwire and the positioning of the archwire in a plane that is defined theoretically by leveling the BSP for each tooth so that each of the BSP's in a jaw are common to a plane (see col. 6 lines 54-59). The Doyle method further involves, for each tooth, the positioning of the bracket onto the archwire. In order to overcome the differences between the theoretical, calculated positioning of the brackets (i.e. the BSPs) and the

resultant positioning of the brackets on the archwire, a "fine-tuning" is carried out which involves calculations based on the following data: statistical information (e.g. the data relating to a "statistically average" tooth) (see Fig. 12 and text in col. 7 lines 42-50); the measured data (i.e. the data corresponding to the specific patient's tooth); information relating to the specific bracket in use (e.g. torque information).

In contrast to the presently claimed invention, the cited prior art combination does not disclose, teach or suggest "using a set of rules, including at least one rule, defining the effect of said set of components on said teeth, computing the manner of movements of the teeth as a result of said effect, so as to obtain a third image comprising the teeth model following the virtual treatment" as recited in claim 27. There is simply no disclosure, teaching or suggestion of the computation of the manner of movement of each tooth with the bracket associated therewith but rather the computation of a model of the movement of a theoretical, statistic tooth and "fine tuning" of this model based on information relating to the specific patient, specific bracket and specific archwire that are used.

Furthermore, the cited prior art combination does not disclose, teach or suggest "associating the virtual set of components with the teeth in said virtual image in a manner resembling that in which such components are associated with teeth in an orthodontic treatment, to obtain a second image of said 3D model with said components associated therewith," as recited in claim 27. The cited prior art combination is silent as to the association of the brackets with the teeth in order to compute the movements of the teeth, as the outcome of Doyle's virtual treatment is calculated at first based on the theoretical BSP's and other theoretical and statistical data, and only afterwards by considering data relating to the specific archwire and brackets in use.

In particular, Doyle does not disclose selecting, for a jaw, brackets and an archwire; associating

the brackets with the teeth of the jaw and using a set of rules including a rule that requires each slot to engage the wire, for the computing the manner of movement of each tooth with the bracket associated therewith.

Thus, the Doyle et al. '158 patent combined with the Wu et al. '198 patent does not disclose, teach, or suggest the features recited in claim 27 or in the claims depending therefrom.

In particular, and referring to claim 28, Doyle et al does not disclose nor suggest this claim. While Doyle discloses a number "loops", these do not relate to altering and repeating steps (a), (b) or (c) of claim 1. Rather, these loops relate to comparisons made between the axial line of the tooth with other parameters – there is no suggestion or disclosure of changing the selection of orthodontic component (in contrast to step (a)), or of modifying the 3D teeth image (in contrast to step (b)), or modifying the rules (in contrast to step (c)). Thus, claim 28 is not rendered obvious by the cited references.

Accordingly, Applicants respectfully requests that the Examiner reconsider and withdraw the rejection.

3. The Doyle et al. '158 patent in view of the Wu et al '198 patent in view of the Guess et al. Publication

The Examiner rejected claims 50 – 54 as being unpatentable over the Doyle et al. '158 patent in view of the Wu et al. '198 patent and the Guess et al. publication.

Response

By this Response, Applicant respectfully traverses the Examiner's rejection since all of the features of the presently claimed invention are not disclosed, taught or suggested by the cited prior art combination. The arguments above with respect to the Doyle et al. '158 patent in view of the Wu

et al. '198 patent are incorporated by reference.

Claim 50 recites: [a] method for selecting real-life orthodontic components for use in an orthodontic treatment of an individual, the method comprising: (i) in a computer: (a) selecting a virtual set of orthodontic components representing real-life orthodontic components that may be used in an orthodontic treatment, said virtual set of components simulating the components of said real-life set, (b) providing a first virtual three-dimensional (3D) image of a 3D model of the individual's teeth comprising teeth of at least one jaw, the model being manipulable so as to allow its viewing from a desired direction, (c) associating the virtual set of components with the teeth in said virtual image in a manner resembling that in which such components are associated with teeth in an orthodontic treatment, to obtain a second image of said 3D model with said components associated therewith, and (d) using a set of rules, including at least one rule, defining the effect of said set of components on said teeth, computing the manner of movement of the teeth as a result of said effect, so as to obtain a third image comprising the teeth model following the virtual treatment; and (ii) repeating step (i) a plurality of times until said substep (d) provides a desired result of the virtual treatment, wherein each time step (i) is repeated at least one of the following is changed: - (A) in step (a) at least one said orthodontic components is changed for a different orthodontic component; (B) in step (b) said association of at least one said orthodontic component with respect to a tooth in said virtual image is changed with respect to the preceding association."

The Guess et al. publication does not cure the deficiencies of the cited primary prior art references. The Guess et al. publication discloses that bracket prescriptions could be accomplished through telecommunication to a manufacturer, which would use CAD/CAM to produce optimal torque, tip and base designs based on the physiology and desired tooth movements for a patient.

In contrast to the presently claimed invention, the cited prior art combination does not disclose,

teach or suggest that "wherein each time step (i) is repeated at least one of the following is changed: -
(A) in step (a) at least one said orthodontic components is changed for a different orthodontic component; (B) in step (b) said association of at least one said orthodontic component with respect to a tooth in said virtual image is changed with respect to the preceding association" as recited in of claim 50. Thus, the present invention, as currently claimed in claims 27-54, is patentably distinguishable from the cited references.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejections.

CONCLUSION

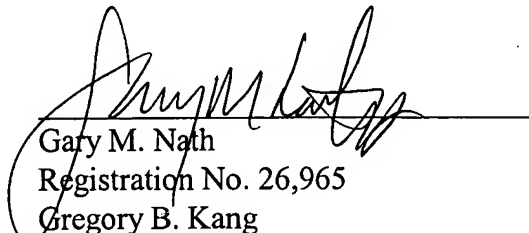
In light of the foregoing, Applicants submit that the application is now in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicants respectfully request that the Examiner contact the undersigned attorney if it is believed that such contact will expedite the prosecution of the application.

In the event this paper is not timely filed, Applicants petition for an appropriate extension of time. Please charge any fee deficiency or credit any overpayment to Deposit Account No. 14-0112.

Respectfully submitted,
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Appl. No. 10/749,388
Reply to Office Action of Feb. 23, 2006
Attorney Docket No. 25306y

APPENDIX